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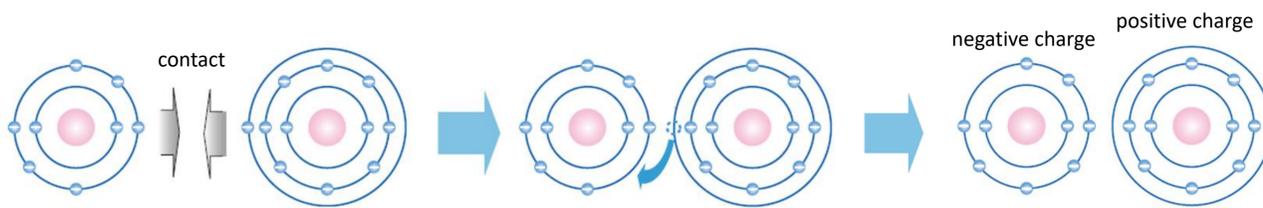
Institute of Wood Technology and Renewable Materials



Triboelectric activation of wood surfaces by mechanical friction

Contact electrification

When two materials come into contact, charge is transferred. This charge transfer is called contact electrification or frictional electricity. When the materials are separated again, the imbalance of the electrostatic charge becomes obvious and the static electricity becomes visible. During contact, each of the two materials develops a charge of opposite polarity.

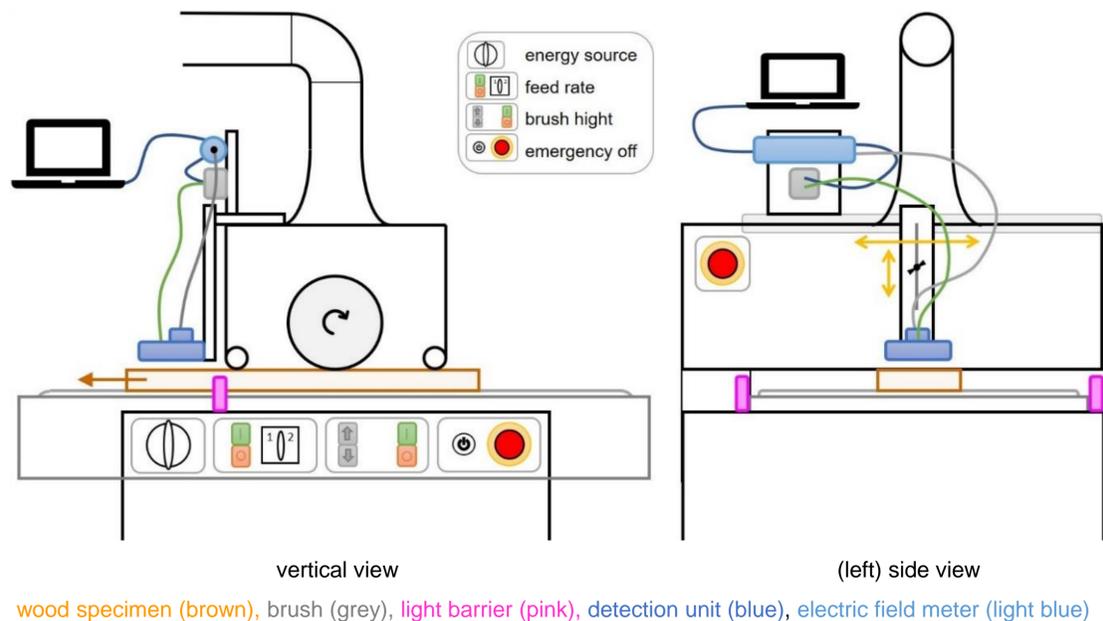


Analysis parameters

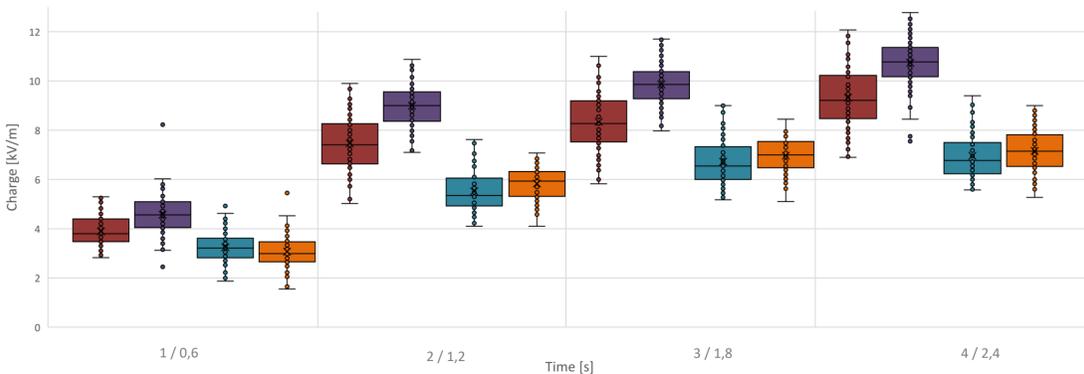
- Machinery dependent
 - brush pressure
 - feed rate
- Depending on brushes
 - material
 - grainsize
- Workpiece dependent
 - wood species

Measuring

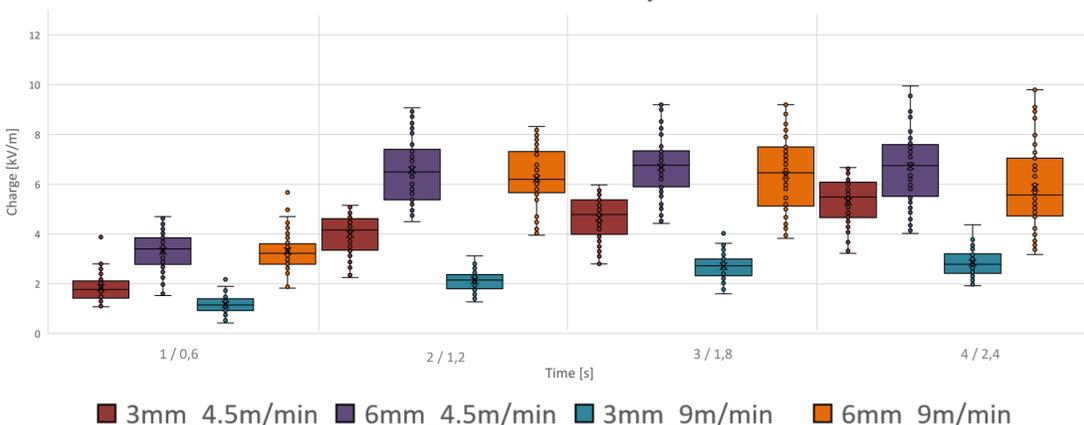
After the brushing (grey) the electrical surface charges were detected with the EFM 115 (light blue), a small electric field meter with high sensitivity for measuring the electric direct voltage field. The detection unit (blue) is connected to the EFM which transfers the information to the laptop on which the EFMX5_ReadOut software is installed. A light barrier (pink) is installed between the brushing sector and the detector unit. If the light barrier recognises a material moving on the conveyor belt the grounding is deactivated and the surface charge is measured and recorded.



Beech wood brushed with Nylon K46



Fir wood brushed with Nylon K46



Preliminary results

- wood surfaces may charge positively as well as negatively
- depending on the wood species, the same change in analysis parameter can lead to different charging results:
 - Beech wood brushed with Nylon K46: slower feed rate (4.5 m/min) leads to a sig. higher charge; brush pressure was less influential
 - Fir wood brushed with Nylon K46: higher brush pressure (6 mm) leads to a sig. higher charge; feed rate has less impact
- finer grained nylon brushes lead to a higher charge. but also to a greater scattering
- the overall electrical charge variability for softwood is less than for hardwood

Possible Application

The knowledge about triboelectric activation of wood surfaces could lead to new technologies in wood finishing. Commonly, electric charges are seen as unwanted, however, there is a positive use of this so-far less appreciated phenomenon.